



BEST AVAILABLE COPY

SEQUENCE LISTING

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<120> METHODS FOR MAKING AND USING FATTY ACID
SYNTHESIS PATHWAY REAGENTS

<130> GM50068

<140> TO BE ASSIGNED

<141> 2002-03-25

<150> PCT/US00/29451

<151> 2000-10-26

<150> 60/161,775

<151> 1999-10-27

<160> 37

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<212> DNA

<213> Staphylococcus aureus

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<211> 332

<212> PRT

<213> Staphylococcus aureus

<400> 2

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Pro	Gly	Gln	Gly	Ala	Gln	Lys	Val	Gly	Met	Ala	Gln	Asp	Leu	Phe	Asn	
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Asn	Asn	Asp	Gln	Ala	Thr	Glu	Ile	Leu	Thr	Ser	Ala	Ala	Lys	Thr	Leu	
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Asp	Phe	Asp	Ile	Leu	Glu	Thr	Met	Phe	Thr	Asp	Glu	Glu	Gly	Lys	Leu	
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Leu	Leu	Ala	Ala	Leu	Lys	Ile	Leu	Asn	Pro	Asp	Phe	Thr	Met	Gly	His	
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Ser	Leu	Gly	Glu	Tyr	Ser	Ser	Leu	Val	Ala	Ala	Asp	Val	Leu	Ser	Phe	
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Glu	Asp	Ala	Val	Lys	Ile	Val	Arg	Lys	Arg	Gly	Gln	Leu	Met	Ala	Gln	
			130				135				140					
Ala	Phe	Pro	Thr	Gly	Val	Gly	Ser	Met	Ala	Ala	Val	Leu	Gly	Leu	Asp	
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Phe	Asp	Lys	Val	Asp	Glu	Ile	Cys	Lys	Ser	Leu	Ser	Ser	Asp	Asp	Lys	
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Ile	Ile	Glu	Pro	Ala	Asn	Ile	Asn	Cys	Pro	Gly	Gln	Ile	Val	Val	Ser	
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Gly	His	Lys	Ala	Leu	Ile	Asp	Glu	Leu	Val	Glu	Lys	Gly	Lys	Ser	Leu
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Gly	Ala	Lys	Arg	Val	Met	Pro	Leu	Ala	Val	Ser	Gly	Pro	Phe	His	Ser
210							215					220			
Ser	Leu	Met	Lys	Val	Ile	Glu	Glu	Asp	Phe	Ser	Ser	Tyr	Ile	Asn	Gln
225					230					235					240
Phe	Glu	Trp	Arg	Asp	Ala	Lys	Phe	Pro	Val	Val	Gln	Asn	Val	Asn	Ala
				245					250					255	
Gln	Gly	Glu	Thr	Asp	Lys	Glu	Val	Ile	Lys	Ser	Asn	Met	Val	Lys	Gln
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Leu	Tyr	Ser	Pro	Val	Gln	Phe	Ile	Asn	Ser	Thr	Glu	Trp	Leu	Ile	Asp
		275						280					285		
Gln	Gly	Val	Asp	His	Phe	Ile	Glu	Ile	Gly	Pro	Gly	Lys	Val	Leu	Ser
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Gly	Leu	Ile	Lys	Lys	Ile	Asn	Arg	Asp	Val	Lys	Leu	Thr	Ser	Ile	Gln
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<212> PRT

<213> Staphylococcus aureus

<400> 3

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			20					25					30		
Ala	Thr	Glu	Ile	Leu	Thr	Ser	Ala	Ala	Lys	Thr	Leu	Asp	Phe	Asp	Ile
		35					40					45			
Leu	Glu	Thr	Met	Phe	Thr	Asp	Glu	Glu	Gly	Lys	Leu	Gly	Glu	Thr	Glu
	50					55					60				
Asn	Thr	Gln	Pro	Ala	Leu	Leu	Thr	His	Ser	Ser	Ala	Leu	Leu	Ala	Ala
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Leu	Lys	Ile	Leu	Asn	Pro	Asp	Phe	Thr	Met	Gly	His	Ser	Leu	Gly	Glu
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Tyr	Ser	Ser	Leu	Val	Ala	Ala	Asp	Val	Leu	Ser	Phe	Glu	Asp	Ala	Val
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Lys Ile Val Arg Lys Arg Gly Gln Leu Met Ala Gln Ala Phe Pro Thr
 115 120 125
 Gly Val Gly Ser Met Ala Ala Val Leu Gly Leu Asp Phe Asp Lys Val
 130 135 140
 Asp Glu Ile Cys Lys Ser Leu Ser Ser Asp Asp Lys Ile Ile Glu Pro
 145 150 155 160
 Ala Asn Ile Asn Cys Pro Gly Gln Ile Val Val Ser Gly His Lys Ala
 165 170 175
 Leu Ile Asp Glu Leu Val Glu Lys Gly Lys Ser Leu Gly Ala Lys Arg
 180 185 190
 Val Met Pro Leu Ala Val Ser Gly Pro Phe His Ser Ser Leu Met Lys
 195 200 205
 Val Ile Glu Glu Asp Phe Ser Ser Tyr Ile Asn Gln Phe Glu Trp Arg
 210 215 220
 Asp Ala Lys Phe Pro Val Val Gln Asn Val Asn Ala Gln Gly Glu Thr
 225 230 235 240
 Asp Lys Glu Val Ile Lys Ser Asn Met Val Lys Gln Leu Tyr Ser Pro
 245 250 255
 Val Gln Phe Ile Asn Ser Thr Glu Trp Leu Ile Asp Gln Gly Val Asp
 260 265 270
 His Phe Ile Glu Ile Gly Pro Gly Lys Val Leu Ser Gly Leu Ile Lys
 275 280 285
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 Val Lys Gly Trp Asn Glu Asn Asp
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<210> 4

<211> 1001

<212> DNA

<213> Staphylococcus aureus

<400> 4

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 tattttgagc aatttttaga tacatctgat gaatggattt ctaagatgac tggaattaaa 180
 gaaagacatt gggcagatga cgatcaagat acttcagatt tagcatatga agcaagtgtgta 240
 aaagcaatcg ctgacgctgg tattcagcct gaagatatag atatgataat tgttgccaca 300
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ggcaaagttg cctctatgga tcaacttgca gcatgttctg gatttatgta ttcaatgatt 420
 acagctaaac aatatgttca atctggagat tatkataata ttttagttgt cgggtgcagat 480
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 gcaggtgagg ttatcatcgg tgaagtttca gaaggcagag gtattataag ttatgaaatg 600
 ggttctgatg gcaactgggtg taaacattta tatttagata aagatactgg taaactgaaa 660
 atgaatgggc gagaagtatt taaatttgct gttagaatta tgggtgatgc atcaacacgt 720
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<210> 5

<211> 333

<212> PRT

<213> Staphylococcus aureus

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			20					25					30		
Pro	Glu	Lys	Ile	Ile	Asp	Asn	Ala	Tyr	Phe	Glu	Gln	Phe	Leu	Asp	Thr
		35					40					45			
Ser	Asp	Glu	Trp	Ile	Ser	Lys	Met	Thr	Gly	Ile	Lys	Glu	Arg	His	Trp
	50					55					60				
Ala	Asp	Asp	Asp	Gln	Asp	Thr	Ser	Asp	Leu	Ala	Tyr	Glu	Ala	Ser	Val
65				70					75					80	
Lys	Ala	Ile	Ala	Asp	Ala	Gly	Ile	Gln	Pro	Glu	Asp	Ile	Asp	Met	Ile
			85					90						95	
Ile	Val	Ala	Thr	Ala	Thr	Gly	Asp	Met	Pro	Phe	Pro	Thr	Val	Ala	Asn
		100						105					110		
Met	Leu	Gln	Glu	Arg	Leu	Gly	Thr	Gly	Lys	Val	Ala	Ser	Met	Asp	Gln
	115					120						125			
Leu	Ala	Ala	Cys	Ser	Gly	Phe	Met	Tyr	Ser	Met	Ile	Thr	Ala	Lys	Gln
	130					135					140				
Tyr	Val	Gln	Ser	Gly	Asp	Tyr	His	Asn	Ile	Leu	Val	Val	Gly	Ala	Asp
145				150					155					160	
Lys	Leu	Ser	Lys	Ile	Thr	Asp	Leu	Thr	Asp	Arg	Ser	Thr	Ala	Val	Leu
			165					170					175		

Phe Gly Asp Gly Ala Gly Ala Val Ile Ile Gly Glu Val Ser Glu Gly
180 185 190
Arg Gly Ile Ile Ser Tyr Glu Met Gly Ser Asp Gly Thr Gly Gly Lys
195 200 205
His Leu Tyr Leu Asp Lys Asp Thr Gly Lys Leu Lys Met Asn Gly Arg
210 215 220
Glu Val Phe Lys Phe Ala Val Arg Ile Met Gly Asp Ala Ser Thr Arg
225 230 235 240
Val Val Glu Lys Ala Asn Leu Thr Ser Asp Asp Ile Asp Leu Phe Ile
245 250 255
Pro His Gln Ala Asn Ile Arg Ile Met Glu Ser Ala Arg Glu Arg Leu
260 265 270
Gly Ile Ser Lys Asp Lys Met Ser Val Ser Val Asn Lys Tyr Gly Asn
275 280 285
Thr Ser Ala Ala Ser Ile Pro Leu Ser Ile Asp Gln Glu Leu Lys Asn
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Gly Lys Leu Lys Asp Asp Asp Thr Ile Val Leu Val Gly Phe Gly Gly
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Gly Leu Thr Trp Gly Ala Met Thr Ile Lys Trp Gly Lys
325 330

<210> 6

<211> 315

<212> PRT

<213> Staphylococcus aureus

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35 40 45
Asp Asp Asp Gln Asp Thr Ser Asp Leu Ala Glu Ala Ser Val Lys Ala
50 55 60
Ile Ala Asp Ala Gly Ile Gln Pro Glu Asp Ile Asp Met Ile Ile Val
65 70 75 80
Ala Thr Ala Thr Gly Asp Met Pro Phe Pro Thr Val Ala Asn Met Leu
85 90 95

Gln Glu Arg Leu Gly Thr Gly Lys Val Ala Ser Met Asp Gln Leu Ala
 100 105 110
 Ala Cys Ser Gly Phe Met Tyr Ser Met Ile Thr Ala Lys Gln Tyr Val
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 Gln Ser Gly Asp Tyr His Asn Ile Leu Val Val Gly Ala Asp Lys Leu
 130 135 140
 Ser Lys Ile Thr Asp Leu Thr Asp Arg Ser Thr Ala Val Leu Phe Gly
 145 150 155 160
 Asp Gly Ala Gly Ala Val Ile Ile Gly Glu Val Ser Glu Gly Arg Gly
 165 170 175
 Ile Ile Ser Tyr Glu Met Gly Ser Asp Gly Thr Gly Gly Lys His Leu
 180 185 190
 Tyr Leu Asp Lys Asp Thr Gly Lys Leu Lys Met Asn Gly Arg Glu Val
 195 200 205
 Phe Lys Phe Ala Val Arg Ile Met Gly Asp Ala Ser Thr Arg Val Val
 210 215 220
 Glu Lys Ala Asn Leu Thr Ser Asp Asp Ile Asp Leu Phe Ile Pro His
 225 230 235 240
 Gln Ala Asn Ile Arg Ile Met Glu Ser Ala Arg Glu Arg Leu Gly Ile
 245 250 255
 Ser Lys Asp Lys Met Ser Val Ser Val Asn Lys Tyr Gly Asn Thr Ser
 260 265 270
 Ala Ala Ser Ile Pro Leu Ser Ile Asp Gln Glu Leu Lys Asn Gly Lys
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<210> 7

<211> 741

<212> DNA

<213> *Staphylococcus aureus*

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 gcaaagtgtg ccgatgctga tgaagttaaa gcaatgatta aagaagtagt tagccaattt 240

gggtcttttag atgtcttagt aaataatgca ggtattactc gcgataattt attaatgcgt 300
 atgaaagaac aagagtggga tgatgttatt gacacaaact taaaaggtgt atttaactgt 360
 atccaaaaag caacaccaca aatgttaaga caacgtagtg gtgctatcat caatttatca 420
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 gaacaaatgt tgactcgaat tccgtagca cgttttggtc aagacacaga tattgctaata 660
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<210> 8

<211> 246

<212> PRT

<213> Staphylococcus aureus

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			20					25					30		
Val	Asn	Tyr	Ala	Gly	Ser	Lys	Glu	Lys	Ala	Glu	Ala	Val	Val	Glu	Glu
		35					40					45			
Ile	Lys	Ala	Lys	Gly	Val	Asp	Ser	Phe	Ala	Ile	Gln	Ala	Asn	Val	Ala
	50					55				60					
Asp	Ala	Asp	Glu	Val	Lys	Ala	Met	Ile	Lys	Glu	Val	Val	Ser	Gln	Phe
65					70				75					80	
Gly	Ser	Leu	Asp	Val	Leu	Val	Asn	Asn	Ala	Gly	Ile	Thr	Arg	Asp	Asn
			85					90					95		
Leu	Leu	Met	Arg	Met	Lys	Glu	Gln	Glu	Trp	Asp	Asp	Val	Ile	Asp	Thr
		100						105					110		
Asn	Leu	Lys	Gly	Val	Phe	Asn	Cys	Ile	Gln	Lys	Ala	Thr	Pro	Gln	Met
		115					120					125			
Leu	Arg	Gln	Arg	Ser	Gly	Ala	Ile	Ile	Asn	Leu	Ser	Ser	Val	Val	Gly
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Ala	Val	Gly	Asn	Pro	Gly	Gln	Ala	Asn	Tyr	Val	Ala	Thr	Lys	Ala	Gly
145				150					155					160	
Val	Ile	Gly	Leu	Thr	Lys	Ser	Ala	Ala	Arg	Glu	Leu	Ala	Ser	Arg	Gly
			165					170					175		
Ile	Thr	Val	Asn	Ala	Val	Ala	Pro	Gly	Phe	Ile	Val	Ser	Asp	Met	Thr
		180						185					190		

Asp Ala Leu Ser Asp Glu Leu Lys Glu Gln Met Leu Thr Arg Ile Pro
 195 200 205
 Leu Ala Arg Phe Gly Gln Asp Thr Asp Ile Ala Asn Thr Val Ala Phe
 210 215 220
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 Asn Gly Gly Met Tyr Met
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<210> 9

<211> 501

<212> DNA

<213> Staphylococcus aureus

<400> 9

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 ttattaattg ataaagtagt tgaatatgaa gaaggtcaac gttgtgtggc tattaaacaa 180
 gtatcaggaa acgaaccatt ctttcaaggg cattttcctg agtatgcggt aatgccaggc 240
 gtattaatta ctgaagcggt agctcaaaca ggtgcggtag ctatttttaa tagtgaagaa 300
 aataaaggta aaatcgcttt atttgctggt attgataaat gtcgttttaa acgtcaagta 360
 gtacctggtg atactttaac gttggaagta gaaatcacta aaattaaagg accaatcggt 420
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<211> 166

<212> PRT

<213> Staphylococcus aureus

<400> 10

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 Ile Ile Pro His Arg Gln Pro Phe Leu Leu Ile Asp Lys Val Val Glu
 35 40 45
 Tyr Glu Glu Gly Gln Arg Cys Val Ala Ile Lys Gln Val Ser Gly Asn
 50 55 60

Glu Pro Phe Phe Gln Gly His Phe Pro Glu Tyr Ala Val Met Pro Gly
 65 70 75 80
 Val Leu Ile Thr Glu Ala Leu Ala Gln Thr Gly Ala Val Ala Ile Leu
 85 90 95
 Asn Ser Glu Glu Asn Lys Gly Lys Ile Ala Leu Phe Ala Gly Ile Asp
 100 105 110
 Lys Cys Arg Phe Lys Arg Gln Val Val Pro Gly Asp Thr Leu Thr Leu
 115 120 125
 Glu Val Glu Ile Thr Lys Ile Lys Gly Pro Ile Gly Lys Gly Asn Ala
 130 135 140
 Lys Ala Thr Val Asp Gly Gln Leu Ala Cys Ser Cys Glu Leu Thr Phe
 145 150 155 160
 Ala Ile Gln Asp Val Lys
 165

<210> 11

<211> 774

<212> DNA

<213> Staphylococcus aureus

<400> 11

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 cgtaaagaac gtagccgtaa agagcttgaa aaattattag aacaattaaa tcaaccagaa 180
 gcgcacttat atcaaattga tgttcaaagc gatgaagagg ttattaatgg ttttgagcaa 240
 attggtaaag atgttggtgca tattgatggg gtatatcatt caatcgcatg tgctaataatg 300
 gaagacttac gcggacgctt ttctgaaact tcacgtgaag gcttcttggt agctcaagac 360
 attagttctt actcattaac aattgtgggt catgaagcta aaaaattaat gccagaaggt 420
 ggtagcattg ttgcaacaac atatttaggt ggcaattcg cagttcaaaa ttataatgtg 480
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 ggtgtgggtg gtttcaatac aattcttaaa gaaatcgaag agcgtgcacc tttaaaacgt 660
 aacgttgatc aagtagaagt aggtaaaaca gcggcttact trttaagtga cttatcaagt 720
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<210> 12

<211> 255

<212> PRT

<213> Staphylococcus aureus

<400> 12

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20 25 30
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35 40 45
Leu Glu Lys Leu Leu Glu Gln Leu Asn Gln Pro Glu Ala His Leu Tyr
50 55 60
Gln Ile Asp Val Gln Ser Asp Glu Glu Val Ile Asn Gly Phe Glu Gln
65 70 75 80
Ile Gly Lys Asp Val Gly Asn Ile Asp Gly Val Tyr His Ser Ile Ala
85 90 95
Phe Ala Asn Met Glu Asp Leu Arg Gly Arg Phe Ser Glu Thr Ser Arg
100 105 110
Glu Gly Phe Leu Leu Ala Gln Asp Ile Ser Ser Tyr Ser Leu Thr Ile
115 120 125
Val Ala His Glu Ala Lys Lys Leu Met Pro Glu Gly Gly Ser Ile Val
130 135 140
Ala Thr Thr Tyr Leu Gly Gly Glu Phe Ala Val Gln Asn Tyr Asn Val
145 150 155 160
Met Gly Val Ala Lys Ala Ser Leu Glu Ala Asn Val Lys Tyr Leu Ala
165 170 175
Leu Asp Leu Gly Pro Asp Asn Ile Arg Val Asn Ala Ile Ser Ala Gly
180 185 190
Pro Ile Arg Thr Leu Ser Ala Lys Gly Val Gly Gly Phe Asn Thr Ile
195 200 205
Leu Lys Glu Ile Glu Glu Arg Ala Pro Leu Lys Arg Asn Val Asp Gln
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Val Glu Val Gly Lys Thr Ala Ala Tyr Leu Leu Ser Asp Leu Ser Ser
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245 250 255

<210> 13

<211> 1245

<212> DNA

<213> Staphylococcus aureus

<400> 13

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cgtatcgata ctgaacctta tagcggtcac ttagcaggag aacttaaaaa ctttaatat 180
gaagatcata tcgacaaaaa agaagcgcgt cgtatggata gatttactca atatgcaatt 240
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cgaatcgggtg tatggattgg ttctgggtatc ggtgggtatgg aaacatttga aattgcacat 360
aaacaattaa tggataaagg cccaagacgt gtgagtccat ttttcgtacc aatgttaatt 420
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cgtccattcc aagaaggtag agacggtttt gttatgggtg aagggtgctgg tatttttagta 720
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tatggtacta caggtgatgc ttatcatatt acagcgccag ctccagaagg tgaaggcgg 840
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ttaaatgcc atggtacaag tactcctggt ggtgacttaa atgaagttaa agctattaaa 960
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cacttacttg gtgcaacagg tggaattgaa gcaatcttct cagcgctttc aattaaagac 1080
tctaaagtcg caccgacaat acatgcggtg acaccagacc cagaatgtga tttggatatt 1140
gttccaaatg aagcgcaaga ccttgatatt acttatgcaa tgagtaatat cttaggattc 1200
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<210> 14

<211> 414

<212> PRT

<213> Staphylococcus aureus

<400> 14

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Pro Ile Gly Asn Asp Val Lys Thr Thr Trp Glu Asn Ala Leu Lys Gly
      20           25           30
Val Asn Gly Ile Asp Lys Ile Thr Arg Ile Asp Thr Glu Pro Tyr Ser
      35           40           45
Val His Leu Ala Gly Glu Leu Lys Asn Phe Asn Ile Glu Asp His Ile
      50           55           60
Asp Lys Lys Glu Ala Arg Arg Met Asp Arg Phe Thr Gln Tyr Ala Ile
65           70           75           80
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Val	Ala	Ala	Arg	Glu	Ala	Val	Lys	Asp	Ala	Gln	Leu	Asp	Ile	Asn	Asp	
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Asn	Thr	Ala	Asp	Arg	Ile	Gly	Val	Trp	Ile	Gly	Ser	Gly	Ile	Gly	Gly	
			100					105					110			
Met	Glu	Thr	Phe	Glu	Ile	Ala	His	Lys	Gln	Leu	Met	Asp	Lys	Gly	Pro	
		115					120					125				
Arg	Arg	Val	Ser	Pro	Phe	Phe	Val	Pro	Met	Leu	Ile	Pro	Asp	Met	Ala	
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Thr	Gly	Gln	Val	Ser	Ile	Asp	Leu	Gly	Ala	Lys	Gly	Pro	Asn	Gly	Ala	
145					150					155					160	
Thr	Val	Thr	Ala	Cys	Ala	Thr	Gly	Thr	Asn	Ser	Ile	Gly	Glu	Ala	Phe	
			165					170					175			
Lys	Ile	Val	Gln	Arg	Gly	Asp	Ala	Asp	Ala	Met	Ile	Thr	Gly	Gly	Thr	
		180					185					190				
Glu	Ala	Pro	Ile	Thr	His	Met	Ala	Ile	Ala	Gly	Phe	Ser	Ala	Ser	Arg	
		195					200					205				
Ala	Leu	Ser	Thr	Asn	Asp	Asp	Ile	Glu	Thr	Ala	Cys	Arg	Pro	Phe	Gln	
		210					215				220					
Glu	Gly	Arg	Asp	Gly	Phe	Val	Met	Gly	Glu	Gly	Ala	Gly	Ile	Leu	Val	
225					230					235					240	
Ile	Glu	Ser	Leu	Glu	Ser	Ala	Gln	Ala	Arg	Gly	Ala	Asn	Ile	Tyr	Ala	
			245					250					255			
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Pro	Ala	Pro	Glu	Gly	Glu	Gly	Gly	Ser	Arg	Ala	Met	Gln	Ala	Ala	Met	
		275					280					285				
Asp	Asp	Ala	Gly	Ile	Glu	Pro	Lys	Asp	Val	Gln	Tyr	Leu	Asn	Ala	His	
		290					295				300					
Gly	Thr	Ser	Thr	Pro	Val	Gly	Asp	Leu	Asn	Glu	Val	Lys	Ala	Ile	Lys	
305				310						315					320	
Asn	Thr	Phe	Gly	Glu	Ala	Ala	Lys	His	Leu	Lys	Val	Ser	Ser	Thr	Lys	
			325					330					335			
Ser	Met	Thr	Gly	His	Leu	Leu	Gly	Ala	Thr	Gly	Gly	Ile	Glu	Ala	Ile	
		340						345					350			
Phe	Ser	Ala	Leu	Ser	Ile	Lys	Asp	Ser	Lys	Val	Ala	Pro	Thr	Ile	His	
		355					360					365				
Ala	Val	Thr	Pro	Asp	Pro	Glu	Cys	Asp	Leu	Asp	Ile	Val	Pro	Asn	Glu	
		370				375					380					
Ala	Gln	Asp	Leu	Asp	Ile	Thr	Tyr	Ala	Met	Ser	Asn	Ser	Leu	Gly	Phe	
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Gly Gly His Asn Ala Val Leu Val Phe Lys Lys Phe Glu Ala
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<210> 15

<211> 975

<212> DNA

<213> Streptococcus pneumoniae

<400> 15

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cgacaaagggc atattttcaag aacagaatct accagtgatt tggctacaga gggttgctaag 180
aaactgatgg caaaagctgg aataacagga aaagaactgg attttatcat cctagctacc 240
attactccag attcgatgat gccctctaca gctgctcgtg ttcaagctaa tattggcgct 300
aataaagcct ttgcttttga cttaaccgcg gcttgccagt gatttgtatt tgctctttca 360
actgctgaaa agtttatcgc ttctggtcgc tttcaaaaag gcttggtgat tggtagtgaa 420
accctctcta aggcagtcga ttggtcggat cgatcaacag ctgtgttggt tggagatggg 480
gctgggtggg tcttggttaga agctagcgag caagagcatt tcttagctga gagtcttaat 540
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tcagatcaag aaagtgcaga ttcgtttttg aagatggatg gacgcacagt ctttgatttt 660
gccattcgag atgtagccaa gtctatcaag cagactattg atgaatctcc tatagagggtg 720
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<210> 16

<211> 324

<212> PRT

<213> Streptococcus pneumoniae

<400> 16

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Val Val Thr Asn His Asp Leu Ala Gln Ile Met Asp Thr Asn Asp Glu
          20           25           30
Trp Ile Ser Ser Arg Thr Gly Ile Arg Gln Arg His Ile Ser Arg Thr
          35           40           45
```

Glu Ser Thr Ser Asp Leu Ala Thr Glu Val Ala Lys Lys Leu Met Ala
 50 55 60
 Lys Ala Gly Ile Thr Gly Lys Glu Leu Asp Phe Ile Ile Leu Ala Thr
 65 70 75 80
 Ile Thr Pro Asp Ser Met Met Pro Ser Thr Ala Ala Arg Val Gln Ala
 85 90 95
 Asn Ile Gly Ala Asn Lys Ala Phe Ala Phe Asp Leu Thr Ala Ala Cys
 100 105 110
 Ser Gly Phe Val Phe Ala Leu Ser Thr Ala Glu Lys Phe Ile Ala Ser
 115 120 125
 Gly Arg Phe Gln Lys Gly Leu Val Ile Gly Ser Glu Thr Leu Ser Lys
 130 135 140
 Ala Val Asp Trp Ser Asp Arg Ser Thr Ala Val Leu Phe Gly Asp Gly
 145 150 155 160
 Ala Gly Gly Val Leu Leu Glu Ala Ser Glu Gln Glu His Phe Leu Ala
 165 170 175
 Glu Ser Leu Asn Ser Asp Gly Ser Arg Ser Glu Cys Leu Thr Tyr Gly
 180 185 190
 His Ser Gly Leu His Ser Pro Phe Ser Asp Gln Glu Ser Ala Asp Ser
 195 200 205
 Phe Leu Lys Met Asp Gly Arg Thr Val Phe Asp Phe Ala Ile Arg Asp
 210 215 220
 Val Ala Lys Ser Ile Lys Gln Thr Ile Asp Glu Ser Pro Ile Glu Val
 225 230 235 240
 Thr Asp Leu Asp Tyr Leu Leu Leu His Gln Ala Asn Asp Arg Ile Leu
 245 250 255
 Asp Lys Met Ala Arg Lys Ile Gly Val Asp Arg Ala Lys Leu Pro Ala
 260 265 270
 Asn Met Met Glu Tyr Gly Asn Thr Ser Ala Ala Ser Ile Pro Ile Leu
 275 280 285
 Leu Ser Glu Cys Val Glu Gln Gly Leu Ile Pro Leu Asp Gly Ser Gln
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<210> 17

<211> 483

<212> DNA

<213> Streptococcus pneumoniae

<400> 17

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gaccgtgtct tggaagtga gaggataacc attgttgcta tcaaaaatgt gaccatcaac 180
gagcctttct ttaacggcca ctttcctcaa taccagtta tgccaggtgt tgtgattatg 240
gaagccttgg cgcaaactgc cgggtgtgtg gagttatcaa aacctgaaaa taaaggaaaa 300
ctggtctttt acgctgggtat ggacaagggtt aagttcaaga agcaagttgt accaggcgac 360
caattgggta tgacagcgac ttttgtaaaa cgtcgtggca ccatagctgt ggttgaagca 420
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taa 483
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<210> 18

<211> 160

<212> PRT

<213> Streptococcus pneumoniae

<400> 18

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      20          25          30
His Arg Tyr Pro Met Leu Leu Val Asp Arg Val Leu Glu Val Ser Glu
      35          40          45
Asp Thr Ile Val Ala Ile Lys Asn Val Thr Ile Asn Glu Pro Phe Phe
      50          55          60
Asn Gly His Phe Pro Gln Tyr Pro Val Met Pro Gly Val Val Ile Met
      65          70          75          80
Glu Ala Leu Ala Gln Thr Ala Gly Val Leu Glu Leu Ser Lys Pro Glu
      85          90          95
Asn Lys Gly Lys Leu Val Phe Tyr Ala Gly Met Asp Lys Val Lys Phe
      100          105          110
Lys Lys Gln Val Val Pro Gly Asp Gln Leu Val Met Thr Ala Thr Phe
      115          120          125
Val Lys Arg Arg Gly Thr Ile Ala Val Val Glu Ala Lys Ala Glu Val
      130          135          140
Asp Gly Lys Leu Ala Ala Ser Gly Thr Leu Thr Phe Ala Ile Gly Asn
      145          150          155          160
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<210> 19

<211> 1296

<212> DNA

<213> Streptococcus pneumoniae

<400> 19

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tttgatcata gtgactttga tgtgcataat gcggcagaaa tccaagattt tccgttcgat 240
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gcagcccaag aggtctgtaa tcatgccaat cttgatgtag aggtctctaa tagggatcgt 360
tttggtgtta tcgttgcata tgggtattgtt ggaatcaagg aaattgaaga tcaggtaact 420
cgccttcata aaaaaggacc caaacgtgtc aaaccaatga ctcttccaaa agctttacca 480
aatatggctt ctgggaatgt agccatgcgt tttggtgcaa acggtgtttg taaatctatc 540
aatactgcct gctcttcata aaatgatgcg attggggatg ccttccgctc cattaagttt 600
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ccatttgata aggatcgcaa tgggtttgtt atgggtgaag gttcagggat gttggttcta 780
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<210> 20

<211> 431

<212> PRT

<213> Streptococcus pneumoniae

<400> 20

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1

5

10

15

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			20						25						30			
Val	Thr	Ser	Pro	Ile	Gly	Asn	Thr	Pro	Glu	Glu	Phe	Trp	Asn	Ser	Leu			
			35						40						45			
Ala	Thr	Gly	Lys	Ile	Gly	Ile	Gly	Gly	Ile	Thr	Lys	Phe	Asp	His	Ser			
			50						55						60			
Asp	Phe	Asp	Val	His	Asn	Ala	Ala	Glu	Ile	Gln	Asp	Phe	Pro	Phe	Asp			
65					70								75				80	
Lys	Tyr	Phe	Val	Lys	Lys	Asp	Thr	Asn	Arg	Phe	Asp	Asn	Tyr	Ser	Leu			
			85						90						95			
Tyr	Ala	Leu	Tyr	Ala	Ala	Gln	Glu	Ala	Val	Asn	His	Ala	Asn	Leu	Asp			
			100						105						110			
Val	Glu	Ala	Leu	Asn	Arg	Asp	Arg	Phe	Gly	Val	Ile	Val	Ala	Ser	Gly			
			115						120						125			
Ile	Gly	Gly	Ile	Lys	Glu	Ile	Glu	Asp	Gln	Val	Leu	Arg	Leu	His	Glu			
			130						135						140			
Lys	Gly	Pro	Lys	Arg	Val	Lys	Pro	Met	Thr	Leu	Pro	Lys	Ala	Leu	Pro			
145					150								155				160	
Asn	Met	Ala	Ser	Gly	Asn	Val	Ala	Met	Arg	Phe	Gly	Ala	Asn	Gly	Val			
			165						170						175			
Cys	Lys	Ser	Ile	Asn	Thr	Ala	Cys	Ser	Ser	Ser	Asn	Asp	Ala	Ile	Gly			
			180						185						190			
Asp	Ala	Phe	Arg	Ser	Ile	Lys	Phe	Gly	Phe	Gln	Asp	Val	Met	Leu	Val			
			195						200						205			
Gly	Gly	Thr	Glu	Ala	Ser	Ile	Thr	Pro	Phe	Ala	Ile	Ala	Gly	Phe	Gln			
			210						215						220			
Ala	Leu	Thr	Ala	Leu	Ser	Thr	Thr	Glu	Asp	Pro	Thr	Arg	Ala	Ser	Ile			
225					230								235				240	
Pro	Phe	Asp	Lys	Asp	Arg	Asn	Gly	Phe	Val	Met	Gly	Glu	Gly	Ser	Gly			
			245						250						255			
Met	Leu	Val	Leu	Glu	Ser	Leu	Glu	His	Ala	Glu	Lys	Arg	Gly	Ala	Thr			
			260						265						270			
Ile	Leu	Ala	Glu	Val	Val	Gly	Tyr	Gly	Asn	Thr	Cys	Asp	Ala	Tyr	His			
			275						280						285			
Met	Thr	Ser	Pro	His	Pro	Glu	Gly	Gln	Gly	Ala	Ile	Lys	Ala	Ile	Lys			
			290						295						300			
Leu	Ala	Leu	Glu	Glu	Ala	Glu	Ile	Ser	Pro	Glu	Gln	Val	Ala	Tyr	Val			
305					310								315				320	
Asn	Ala	His	Gly	Thr	Ser	Thr	Pro	Ala	Asn	Glu	Lys	Gly	Glu	Ser	Gly			
			325						330						335			

Ala Ile Val Ala Val Leu Gly Lys Glu Val Pro Val Ser Ser Thr Lys
340 345 350
Ser Phe Thr Gly His Leu Leu Gly Ala Ala Gly Ala Val Glu Ala Ile
355 360 365
Val Thr Ile Glu Ala Met Arg His Asn Phe Val Pro Met Thr Ala Gly
370 375 380
Thr Ser Glu Val Ser Asp Tyr Ile Glu Ala Asn Val Val Tyr Gly Gln
385 390 395 400
Gly Leu Glu Lys Glu Ile Pro Tyr Ala Ile Ser Asn Thr Phe Gly Phe
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Gly Gly His Asn Ala Val Leu Ala Phe Lys Arg Trp Glu Asn Arg
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<210> 21

<211> 1273

<212> DNA

<213> Escherichia coli

<400> 21

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atcgttgtgg caacgacttc tgctacgcac gctttcccga gcgcagcttg tcagattcaa 480
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<210> 22

<211> 317

<212> PRT

<213> Escherichia coli

<400> 22

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			20					25					30		
Ile	Val	Thr	Arg	Thr	Gly	Ile	Arg	Glu	Arg	His	Ile	Ala	Ala	Pro	Asn
		35					40					45			
Glu	Thr	Val	Ser	Thr	Met	Gly	Phe	Glu	Ala	Ala	Thr	Arg	Ala	Ile	Glu
	50					55					60				
Met	Ala	Gly	Ile	Glu	Lys	Asp	Gln	Ile	Gly	Leu	Ile	Val	Val	Ala	Thr
65				70				75						80	
Thr	Ser	Ala	Thr	His	Ala	Phe	Pro	Ser	Ala	Ala	Cys	Gln	Ile	Gln	Ser
			85					90					95		
Met	Leu	Gly	Ile	Lys	Gly	Cys	Pro	Ala	Phe	Asp	Val	Ala	Ala	Ala	Cys
		100					105					110			
Ala	Gly	Phe	Thr	Tyr	Ala	Leu	Ser	Val	Ala	Asp	Gln	Tyr	Val	Lys	Ser
	115					120					125				
Gly	Ala	Val	Lys	Tyr	Ala	Leu	Val	Val	Gly	Ser	Asp	Val	Leu	Ala	Arg
	130					135					140				
Thr	Cys	Asp	Pro	Thr	Asp	Arg	Gly	Thr	Ile	Ile	Ile	Phe	Gly	Asp	Gly
145				150				155						160	
Ala	Gly	Ala	Ala	Val	Leu	Ala	Ala	Ser	Glu	Glu	Pro	Gly	Ile	Ile	Ser
			165					170				175			
Thr	His	Leu	His	Ala	Asp	Gly	Ser	Tyr	Gly	Glu	Leu	Leu	Thr	Leu	Pro
		180					185					190			
Asn	Ala	Asp	Arg	Val	Asn	Pro	Glu	Asn	Ser	Ile	His	Leu	Thr	Met	Ala
	195					200					205				
Gly	Asn	Glu	Val	Phe	Lys	Val	Ala	Val	Thr	Glu	Leu	Ala	His	Ile	Val
	210				215					220					
Asp	Glu	Thr	Leu	Ala	Ala	Asn	Asn	Leu	Asp	Arg	Ser	Gln	Leu	Asp	Trp
225				230						235				240	

Leu Val Pro His Gln Ala Asn Leu Arg Ile Ile Ser Ala Thr Ala Lys
 245 250 255

Lys Leu Gly Met Ser Met Asp Asn Val Val Val Thr Leu Asp Arg His
 260 265 270

Gly Asn Thr Ser Ala Ala Ser Val Pro Cys Ala Leu Asp Glu Ala Val
 275 280 285

Arg Asp Gly Arg Ile Lys Pro Gly Gln Leu Val Leu Leu Glu Ala Phe
 290 295 300

Gly Gly Gly Phe Thr Trp Gly Ser Ala Leu Val Arg Phe
 305 310 315

<210> 23

<211> 789

<212> DNA

<213> Escherichia coli

<400> 23

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 aacgacaaac tgaaaggccg cgtagaagaa ttgcccgtc aattgggttc tgacatcggt 180
 ctgcagtgcg atgttgcaga agatgccagc atcgacacca tgttcgctga actggggaaa 240
 gtttgggcga aatttgacgg tttcgtacac tctattggtt ttgcacctgg cgatcagctg 300
 gatggtgact atgttaacgc cgttaccgt gaaggcttca aaattgcca cgacatcagc 360
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 ctgaaataa 789

<210> 24

<211> 262

<212> PRT

<213> Escherichia coli

<400> 24

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 Ala Glu Leu Ala Phe Thr Tyr Gln Asn Asp Lys Leu Lys Gly Arg Val
 35 40 45
 Glu Glu Phe Ala Ala Gln Leu Gly Ser Asp Ile Val Leu Gln Cys Asp
 50 55 60
 Val Ala Glu Asp Ala Ser Ile Asp Thr Met Phe Ala Glu Leu Gly Lys
 65 70 75 80
 Val Trp Pro Lys Phe Asp Gly Phe Val His Ser Ile Gly Phe Ala Pro
 85 90 95
 Gly Asp Gln Leu Asp Gly Asp Tyr Val Asn Ala Val Thr Arg Glu Gly
 100 105 110
 Phe Lys Ile Ala His Asp Ile Ser Ser Tyr Ser Phe Val Ala Met Ala
 115 120 125
 Lys Ala Cys Arg Ser Met Leu Asn Pro Gly Ser Ala Leu Leu Thr Leu
 130 135 140
 Ser Tyr Leu Gly Ala Glu Arg Ala Ile Pro Asn Tyr Asn Val Met Gly
 145 150 155 160
 Leu Ala Lys Ala Ser Leu Glu Ala Asn Val Arg Tyr Met Ala Asn Ala
 165 170 175
 Met Gly Pro Glu Gly Val Arg Val Asn Ala Ile Ser Ala Gly Pro Ile
 180 185 190
 Arg Thr Leu Ala Ala Ser Gly Ile Lys Asp Phe Arg Lys Met Leu Ala
 195 200 205
 His Cys Glu Ala Val Thr Pro Ile Arg Arg Thr Val Thr Ile Glu Asp
 210 215 220
 Val Gly Asn Ser Ala Ala Phe Leu Cys Ser Asp Leu Ser Ala Gly Ile
 225 230 235 240
 Ser Gly Glu Val Val His Val Asp Gly Gly Phe Ser Ile Ala Ala Met
 245 250 255
 Asn Glu Leu Glu Leu Lys
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<210> 25

<211> 234

<212> DNA

<213> Staphylococcus aureus

<400> 25

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gaattagtaa tggaattaga agacgagttt ggtactgaaa ttcctgatga agaagctgaa 180
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<210> 26

<211> 77

<212> PRT

<213> *Staphylococcus aureus*

<400> 26

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			20					25					30		
Gly	Ala	Asp	Ser	Leu	Asp	Ile	Ala	Glu	Leu	Val	Met	Glu	Leu	Glu	Asp
		35					40					45			
Glu	Phe	Gly	Thr	Glu	Ile	Pro	Asp	Glu	Glu	Ala	Glu	Lys	Ile	Asn	Thr
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Val	Gly	Asp	Ala	Val	Lys	Phe	Ile	Asn	Ser	Leu	Glu	Lys			
65					70					75					

<210> 27

<211> 234

<212> DNA

<213> *Streptococcus pneumoniae*

<400> 27

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ttgatggagt ttatcttgac gctggaggat gaatttagta tcgaaatcag cgatgaggaa 180
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<210> 28

<211> 77

<212> PRT

<213> *Streptococcus pneumoniae*

<400> 28

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Arg Gln Gly Glu Asp Phe Val Val Thr Glu Ser Leu Ser Leu Lys Asp
20 25 30
Asp Leu Asp Ala Asp Ser Val Asp Leu Met Glu Phe Ile Leu Thr Leu
35 40 45
Glu Asp Glu Phe Ser Ile Glu Ile Ser Asp Glu Glu Ile Asp Gln Leu
50 55 60
Gln Ser Val Gly Asp Val Val Lys Ile Ile Gln Gly Lys
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<210> 29

<211> 225

<212> DNA

<213> Streptococcus pneumoniae

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gtaatctcag aaatcgaaga tgcttttgat atccaaatcg aagcagaaaa tgacttgaaa 180
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<210> 30

<211> 74

<212> PRT

<213> Streptococcus pneumoniae

<400> 30

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20 25 30
Ala Asp Ser Leu Asp Leu Phe Gln Val Ile Ser Glu Ile Glu Asp Ala
35 40 45
Phe Asp Ile Gln Ile Glu Ala Glu Asn Asp Leu Lys Thr Val Gly Asp
50 55 60

Leu Val Ala Tyr Val Glu Glu Gln Ala Lys

65

70

<210> 31

<211> 951

<212> DNA

<213> Haemophilus influenzae

<400> 31

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gaacgtcgta tcgcagcgga agatgaaact gttgcaacaa tgggatttga agcggcaaaa 180
aatgcgatcg aagctgctca aattaatcct caagatattg aactgattat tgttgcaact 240
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ctcaattctc gtaaattaga tgaaacagat cgcagcactg ttgtgctatt tggatgatgg 480
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<210> 32

<211> 316

<212> PRT

<213> Haemophilus influenzae

<400> 32

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      20           25           30
Ile Val Thr Arg Ser Gly Ile Arg Glu Arg Arg Ile Ala Ala Glu Asp
      35           40           45
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Glu Thr Val Ala Thr Met Gly Phe Glu Ala Ala Lys Asn Ala Ile Glu
 50 55 60
 Ala Ala Gln Ile Asn Pro Gln Asp Ile Glu Leu Ile Ile Val Ala Thr
 65 70 75 80
 Thr Ser His Ser His Ala Tyr Pro Ser Ala Ala Cys Gln Val Gln Gly
 85 90 95
 Leu Leu Asn Ile Asp Asp Ala Ile Ser Phe Asp Leu Ala Ala Ala Cys
 100 105 110
 Thr Gly Phe Val Tyr Ala Leu Ser Val Ala Asp Gln Phe Ile Arg Ala
 115 120 125
 Gly Lys Val Lys Lys Ala Leu Val Ile Gly Ser Asp Leu Asn Ser Arg
 130 135 140
 Lys Leu Asp Glu Thr Asp Arg Ser Thr Val Val Leu Phe Gly Asp Gly
 145 150 155 160
 Ala Gly Ala Val Ile Leu Glu Ala Ser Glu Gln Glu Gly Ile Ile Ser
 165 170 175
 Thr His Leu His Ala Ser Ala Asn Lys Asn Asn Ala Leu Val Leu Ala
 180 185 190
 Gln Pro Glu Arg Gly Ile Glu Lys Ser Gly Tyr Ile Glu Met Gln Gly
 195 200 205
 Asn Glu Thr Phe Lys Leu Ala Val Arg Glu Leu Ser Asn Val Val Glu
 210 215 220
 Glu Thr Leu Ser Ala Asn Asn Leu Asp Lys Lys Asp Leu Asp Trp Leu
 225 230 235 240
 Val Pro His Gln Ala Asn Leu Arg Ile Ile Thr Ala Thr Ala Lys Lys
 245 250 255
 Leu Glu Met Asp Met Ser Gln Val Val Val Thr Leu Asp Lys Tyr Ala
 260 265 270
 Asn Asn Ser Ala Ala Thr Val Pro Val Ala Leu Asp Glu Ala Val Arg
 275 280 285
 Asp Gly Arg Ile Gln Arg Gly Gln Leu Leu Leu Leu Glu Ala Phe Gly
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 Gly Gly Trp Thr Trp Gly Ser Ala Leu Val Arg Phe
 305 310 315

<210> 33

<211> 233

<212> DNA

<213> Escherichia coli

<400> 33

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gttgagctgg taatggctct ggagaagagt ttgatactga gattccggac gaagaagctg 180
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<210> 34

<211> 78

<212> PRT

<213> Escherichia coli

<400> 34

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Gly Val Lys Gln Glu Glu Val Thr Asn Asn Ala Ser Phe Val Glu Asp
20 25 30
Leu Gly Ala Asp Ser Leu Asp Thr Val Glu Leu Val Met Ala Leu Glu
35 40 45
Glu Glu Phe Asp Thr Glu Ile Pro Asp Glu Glu Ala Glu Lys Ile Thr
50 55 60
Thr Val Gln Ala Ala Ile Asp Tyr Ile Asn Gly His Gln Ala
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<210> 35

<211> 29

<212> DNA

<213> Streptococcus pneumoniae

<400> 35

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29

<210> 36

<211> 29

<212> DNA

<213> Streptococcus pneumoniae

<400> 36

ggcggatcct tagtcatttc ttacaactc

29

<210> 37

<211> 324

<212> PRT

<213> Streptococcus pneumoniae

<400> 37

Met	Lys	Thr	Arg	Ile	Thr	Glu	Leu	Leu	Lys	Ile	Asp	Tyr	Pro	Ile	Phe
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Gln	Gly	Gly	Met	Ala	Trp	Val	Ala	Asp	Gly	Asp	Leu	Ala	Gly	Ala	Val
			20					25					30		
Ser	Lys	Ala	Gly	Gly	Leu	Gly	Ile	Ile	Gly	Gly	Gly	Asn	Ala	Pro	Lys
		35					40					45			
Glu	Val	Val	Lys	Ala	Asn	Ile	Asp	Lys	Ile	Lys	Ser	Leu	Thr	Asp	Lys
	50					55					60				
Pro	Phe	Gly	Val	Asn	Ile	Met	Leu	Leu	Ser	Pro	Phe	Val	Glu	Asp	Ile
65				70					75					80	
Val	Asp	Leu	Val	Ile	Glu	Glu	Gly	Val	Lys	Val	Val	Thr	Thr	Gly	Ala
				85					90					95	
Gly	Asn	Pro	Ser	Lys	Tyr	Met	Glu	Arg	Phe	His	Glu	Ala	Gly	Ile	Ile
		100						105					110		
Val	Ile	Pro	Val	Val	Pro	Ser	Val	Ala	Leu	Ala	Lys	Arg	Met	Glu	Lys
	115						120					125			
Ile	Gly	Ala	Asp	Ala	Val	Ile	Ala	Glu	Gly	Met	Glu	Ala	Gly	Gly	His
	130					135					140				
Ile	Gly	Lys	Leu	Thr	Thr	Met	Thr	Leu	Val	Arg	Gln	Val	Ala	Thr	Ala
145				150					155					160	
Ile	Ser	Ile	Pro	Val	Ile	Ala	Ala	Gly	Gly	Ile	Ala	Asp	Gly	Glu	Gly
			165						170					175	
Ala	Ala	Ala	Gly	Phe	Met	Leu	Gly	Ala	Glu	Ala	Val	Gln	Val	Gly	Thr
		180						185					190		
Arg	Phe	Val	Val	Ala	Lys	Glu	Ser	Asn	Ala	His	Pro	Asn	Tyr	Lys	Glu
	195						200					205			
Lys	Ile	Leu	Lys	Ala	Arg	Asp	Ile	Asp	Thr	Thr	Ile	Ser	Ala	Gln	His
	210					215					220				
Phe	Gly	His	Ala	Val	Arg	Ala	Ile	Lys	Asn	Gln	Leu	Thr	Arg	Asp	Phe
225				230						235				240	
Glu	Leu	Ala	Glu	Lys	Asp	Ala	Phe	Lys	Gln	Glu	Asp	Pro	Asp	Leu	Glu
			245						250					255	

Ile Phe Glu Gln Met Gly Ala Gly Ala Leu Ala Lys Ala Val Val His
260 265 270
Gly Asp Val Asp Gly Gly Ser Val Met Ala Gly Gln Ile Ala Gly Leu
275 280 285
Val Ser Lys Glu Glu Thr Ala Glu Glu Ile Leu Lys Asp Leu Tyr Tyr
290 295 300
Gly Ala Ala Lys Lys Ile Gln Glu Glu Ala Ser Arg Trp Ala Gly Val
305 310 315 320
Val Arg Asn Asp

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